REMARKS

In response to the Office Action mailed May 4, 2004, the Applicant respectfully requests that the Examiner enter the above amendments and consider the following remarks. Claims 1 and 48 have been amended to more clearly describe the invention. In addition, claims 6-20 and 24-47, which were previously withdrawn from consideration by the Examiner, were canceled in order to add new claims 55-63 without incurring fees for excess claims. As a result, claims 1-5, 21-23, and 48-63 are pending in the application. The Applicant respectfully requests further examination and reconsideration of the application in light of the amendments and accompanying remarks.

Rejection of Claims 1-5, 21-23, and 48-54 Under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-5, 21-23, and 48-54 under 35 U.S.C. § 103(a) as being unpatentable over Gamson (USPN 3,684,697) in view of Mallari (USPN 4,797,197). The Applicant respectfully traverses the rejection.

Claims 1-5, 21-23, and 48-54 are NOT obvious from Gamson (USPN 3,684,697) in view of Mallari (USPN 4,797,197). Gamson (USPN 3,684,697) generally teaches a feedstock dilution method of the delayed coking process to produce sponge coke suitable for the manufacture of graphite and carbon electrodes used in the

aluminum industry. Hydrocarbon bottoms which have low asphaltenes contents (e.g., below about 8 %) are added to coking feedstocks with asphaltenes content above about 13 % (as measured by ASTM D2006). Gamson teaches that the dilution of the asphaltenes content below 13 % (on its own) is sufficient to effect a change of coke crystalline structure from shot coke production to sponge coke production. However, Gamson does not teach that the asphaltenes content of the coking feedstock can still form shot coke (desolutation of asphaltenes/resins) without sufficient levels of hydrocarbons (e.g., aromatics) that behave as solvents for asphaltenes. In addition, Gamson does not teach that the resins content can have similar effects in shot coke production as asphaltenes content in the coke precursor materials. Accordingly, Gamson fails to teach or suggest maintaining the ratio of asphaltic coke to thermal coke at a sufficiently low level for promoting the production of sponge coke. Furthermore, in column 1, lines 24-30, Gamson teaches that shot coke, not sponge coke, is used principally for fuel. Gamson does not teach producing a porous, sponge coke for use in a combustion process. Instead, Gamson teaches the production of sponge coke with characteristics favorable for the manufacture of graphite and carbon electrodes used in the aluminum industry.

Gamson generically discusses limited conventional coking operating conditions (including higher pressures) which promote the formation of sponge coke in conventional coking, but Gamson does not specifically teach how these conventional

coking operating conditions promote sponge coke production. In contrast, the Applicant specifically teaches various methods in the coking process to produce very porous sponge coke from coking feedstocks that normally produce shot coke in traditional coking processes. The current invention discloses how these various methods bring about the desired ratio of asphaltic coke to thermal coke to produce porous sponge coke and overcome the shortcomings of Gamson. Furthermore, the claimed method produces sponge coke that is more porous and has higher VCM content than sponge coke made under conventional coking operating conditions. The primary method controls the coke quality via thermal process operating conditions, primarily reducing the coke drum temperature (e.g., coking cycle quench). Thus, the methods of the current invention to produce porous sponge coke are distinguished over the coking feedstock dillution method of Gamson's expired patent to reduce asphaltenes content below about 13% and promote the production of sponge coke for the manufacture of graphite and carbon electrodes used in the aluminum industry; not only in methods, but also as a different purpose or new use of combusting the sponge coke in a combustion process.

The Applicant respectfully submits that Mallari (USPN 4,797,197) generally teaches the addition of a vessel (i.e., flasher drum) to the traditional delayed coker system of the prior art to separate the two-phase discharge of the feed heater prior to the coking drums to reduce the partial pressure of hydrocarbon vapors in the coking

drum. In so doing, Mallari effectively increases the cracking and vaporization of heavy hydrocarbons that would "otherwise react extensively in repetitive fashion to produce more coke than necessary" (as stated in the Abstract) in the traditional delayed coker system of the prior art. More specifically, Mallari (USPN 4,797,197) teaches the use of an injection vapor in the coking drums to control hydrocarbon partial pressure and control VCM levels at a minimum of 4-6 % VCM, preferably 6-8 %, in the green coke product. Since Mallari discloses VCM control as a means to effect the reduction of coke yield (and for greater hydrocarbon yield) in the coke drum, Mallari teaches, in effect, the minimization of VCM, consequently below the 8-12 % VCM of traditional delayed cokers of the prior art and far below the VCM level of the current invention (i.e., 13-50 % VCM as set forth in dependent claim 2). Mallari does not teach the methods of the current invention to control the quality and quantity of VCMs in a coke product used for fuel. With respect to fluid injections, Mallari teaches spraying light gas oil in the flasher drum vapor (vs. coking drum vapor) to stop the continuation of the coking reaction in the vapor line (vs. vapor cracking reaction quench and condensation of materials with highest propensity to coke within the coke drum). Furthermore, Mallari teaches the injection of hydrogen gas, steam and fuel gas for the purpose of furnishing additional heat to the liquid portion of the flasher drum, not for the purpose of quenching the vapor in the coking drums. As such, Mallari does not teach the various methods of injecting quench media for the purpose of quenching the vapor in the coking

drums to inhibit cracking reactions within the vapor and condense the heaviest components of the vapor that have the highest propensity to coke and be converted to coke. Consequently, the Applicant respectively submits that the various methods of the current invention which provide for (1) controlling the product coke's VCM quantity (13 – 50 wt.%) & quality and (2) the injection of various quench media into the vapor of the coking drums are distinguished over the methods and purposes for VCM control and liquid injections of Mallari (USPN 4,797,197).

The Applicant respectfully submits that the combination suggested by the Examiner would not be obvious to one skilled in the art. The combination of the production of sponge coke via Gamson (USPN 3,684,697) and the VCM control and fluids injections of Mallari (USPN 4,797,197) is submitted to be improper because this combination would not teach the claims of this invention. Furthermore, neither Gamson nor Mallari suggest such a combination, and one skilled in the art would have no reason to make such a combination. Gamson does not teach or suggest a thermal cracking process or method to produce a sponge coke for use in a combustion process. Likewise, Mallari does not teach or suggest the various methods of the current invention which provide for (1) controlling the product coke's VCM quantity (13-50 wt.%) & quality and (2) the injection of various quench media into the vapor of the coking drums. Accordingly, there is no motivation in the prior art to combine the references as suggested by the Examiner, and the proposed combination of these references still

does not teach or suggest every limitation of the present invention. Finally, the Applicant's own experience has demonstrated this combination is not obvious to ones skilled in the art. The Applicant is working with experienced coker process engineers at refineries that have been using coking feedstocks which normally produce shot coke with traditional coking operations of the prior art. None of them use the expired patented technology of Gamson to convert shot coke to sponge coke production. Yet, these coker process engineers have asked the Applicant to make this conversion. In addition, one coker process engineer has successfully tested principles of the current invention (with permission & assistance of the Applicant) to temporarily change from shot coke to sponge coke production in their commercial unit, while using a coking feedstock that normally produces shot coke with traditional coking operations of the prior art. Thus, this combination of references is clearly not obvious to ones skilled in the art.

In conclusion, the Applicant respectfully submits that the novel thermal cracking process options and methods of the current invention are (1) unobvious to one skilled in the art and (2) these distinctions of the present invention provide surprising and unexpected results and are patentable under Section 103. Therefore, Gamson and Mallari provide no motivation to combine or modify the references as suggested by the Examiner in order to arrive at the claimed invention. Only after the knowledge presented in the specification of the current invention can ones skilled in the art arrive

at the present invention.

Since the novel physical features of the Applicant's modified petroleum coke provide these new and unexpected results over any reference, the Applicant submits that these new results indicate unobviousness and hence patentability. Therefore, the Applicant respectfully submits that no combination of the cited references can support the rejection of claims 1-5, 21-23, and 48-54 under 35 U.S.C. § 103(a). Accordingly, the Applicant respectfully requests reconsideration and allowance of the present application with the above-amended claims.

Amendment to the Specification

The Applicant has amended paragraph [0287] of the specification. Paragraph [0287] now more clearly identifies a process in which a drill stem is positioned a distance of 0.5-20 feet, preferably 2-10 feet, more preferably 5-10 feet, above a coke mass. The Applicant respectfully submits that no new matter has been added in light of claim 23 as originally filed, which is a portion of the specification.

Conclusion

The Applicant has distinguished claims 1-5, 21-23, and 48-63 over the cited references. Therefore, the Applicant respectfully submits that the present application is now in condition for allowance, and such action is earnestly requested.

Respectfully submitted,

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Jeffrey C. Norris
Registration No. 42,039
Standley Law Group LLP
495 Metro Place South
Suite 210
Dublin, Ohio 43017-5319
Telephone: (614) 792-5555
Fax: (614) 792-5536
E-mail: jnorris@standleyllp.com